

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Inter Patent Application of

Yiu Ming CHEUNG et al.

Date: June 1, 2006

Serial No.: 10/628,503

Group Art Unit: 2823

Filed: July 28, 2003

Examiner: COLEMAN, William D.

For: APPARATUS AND METHOD FOR THIN DIE DETACHMENT

**Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450**

APPEAL BRIEF TRANSMITTAL LETTER - AMENDED BRIEF

Sir:

Transmitted herewith is an Amended Appeal Brief correcting the defects indicated in the Notice of Non-Compliant Appeal Brief mailed March 22, 2006.

Attention is respectfully directed to the fact that the title has also been corrected to reflect the rule currently applicable to appeal briefs, and a typographical error on page 11 has been corrected.

Attention is further respectfully directed to the fact that MPEP §1205.03 states:

If the evidence appendix and relating proceedings appendix are missing, but the record is clear that there is no evidence submitted and no related proceedings listed in the related appeals and interferences section, the Examiner may accept the brief ...

It is not understood why that procedure was not followed in the present instance.

No fee is required for the filing of this Amended Appeal Brief as the fee was submitted with the filing of the original Appeal Brief on December 29, 2005.

In the event the actual fee is greater than the payment submitted or is inadvertently not enclosed or if any additional fee during the prosecution of this application is not paid, the Patent Office is authorized to charge the underpayment to Deposit Account No. 15-0700.

If this communication is filed after the shortened statutory time period had elapsed and no separate Petition is enclosed, the Commissioner of Patents and Trademarks is petitioned, under 37 C.F.R. §1.136(a), to extend the time for filing a response to the outstanding Office Action by the number of months which will avoid abandonment under 37 C.F.R. §1.135. The fee under 37 C.F.R.

§ 1.17 should be charged to our Deposit Account No. 15-0700.rejection should accordingly be reversed.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Mail Stop Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on June 1, 2006:

Lawrence A Hoffman

Name of applicant, assignee or
Registered Representative

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Signature

June 1, 2006

Date of Signature

LAH:lac

Respectfully submitted,

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P/4076-55

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AMENDED APPEAL BRIEF PURSUANT TO 37 C.F.R. §41.37

Sir:

This is an appeal of the Examiner's final rejection dated May 31, 2005 in connection with the above-identified application. The Notice of Appeal was dated August 30, 2005.

I. STATUS OF CLAIMS:

Claims 2-10, 21, and 22 are pending. Claims 2-10 and 21 have been finally rejected and are on appeal. Claim 22 has been objected to as being dependent on a rejected base claim, but has been indicated to be allowable if rewritten in independent form including all the limitations of the base claim (21) and intervening claims (8 and 9).¹ The rejected claims are set forth in clean form in Appendix A hereto.

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1. In an Advisory Action mailed August 12, 2005, claim 22 was indicated as being withdrawn from consideration. Regrettably, the Examiner gave no reason for withdrawing this claim from consideration. There is no basis for his doing so, in any event.

II. REAL PARTY IN INTEREST:

The real party in interest is the assignee, ASM Assembly Automation, Ltd., a Corporation organized under the laws of Hong Kong, China.

III. RELATED APPEALS AND INTERFERENCES:

There are no related appeals or interferences.

IV. STATUS OF AMENDMENTS:

No un-entered amendments are pending.

V. BACKGROUND OF THIS APPEAL

A. Summary of the Invention

The present invention relates to semiconductor chip processing, and more particularly, to transfer of individual semiconductor dice after fabrication so that a die can be bonded to a substrate for formation into an electronic circuit package. Integrated circuits are produced by fabrication of multiple electronic circuit units on large semiconductor wafers. The wafers must then be split into dice or chips for further processing. Customarily, the wafers are detachably adhered to thin plastic films before dicing, and the individual dice must be detached from the film for transfer to a bonding station.

In a typical die bonding process, a designated individual die is positioned at a detachment station where push-up pins rise to push up on the plastic adhesive film from below while it is held down by vacuum suction. A vacuum collet or pick-up tool is positioned just above the top surface of the die to receive the die when the push-up pins rise to an appropriate level to release the die from the film. The collet then transfers the die to the bonding location.

For small dice (say, less than 2 mm in width), detachment is accomplished by a single centrally positioned ejector pin. However, for larger dice, multiple ejector pins are used in order to evenly distribute the push-up force on the die and reduce a pinching effect by the ejector pins. For such large dice, and also for thin dice, there is a risk that a die may break or crack during the detachment process. This is primarily due to bending stress induced by the pushing up of the pins before

separation of the die from the adhesive film takes place. This can also be a problem when there is strong adhesion force between the die and the film.

Several conventional solutions intended to address this problem are described in the specification, but the known solutions are not entirely satisfactory for chips which are both large *and* thin.

According to the invention, this problem can be alleviated by use of an apparatus having an array of four ejector pins positioned to contact the underside of the film substantially under the corners of the die to *initiate* the separation. The separation process is then completed by a vacuum collet which lifts the partially delaminated die off the film, and carries it to the bonding location. A centrally located pin may optionally be provided to assist in the final separation. The Specification demonstrates the importance of initiating the delamination process by pins located substantially at the corners of dice which are particularly subject to cracking due to their dimensions or other properties.

B. Procedural History of this Application

With all due respect for the workload of the Examiner, it seems that this application might have benefitted from greater attention to detail on his part. For example, the application was originally filed on July 28, 2003 with 20 claims. In a first Office Action dated September 29, 2004, restriction was required between claims 1-10, drawn to a "semiconductor apparatus", and claims 11-20, purportedly drawn to "a method of manufacturing a semiconductor apparatus". However, claims 11-20 were not drawn to a method of manufacture of the apparatus of claims 1-10, but rather to a method of *using* the apparatus.

In a communication dated October 18, 2004, claims 1-10 were elected with traverse, mainly on the basis that claims 11-20 had been mischaracterized by the Examiner, and that the Examiner had not shown that the process of claims 11-20 could be practiced by an apparatus materially different from that of claims 1-10. To emphasize this, base method claim 11 was amended to explicitly state that the die was partially delaminated from the film by pushing against the film using a plurality of ejector pins substantially at the corners of the die.

Despite the amendment to claim 11, the requirement for restriction was adhered to in a second Office Action mailed December 28, 2004. To support this, the Examiner cited as a materially

different apparatus for practicing the method, Japanese Published Application 2001-094298, which showed an air nozzles 17 for blowing foreign matter off a mounting apparatus. However, there is no disclosure, teaching or suggestion in JP'298 for using air in an apparatus or process for delaminating a chip from an adhesive carrier film, either to initiate delamination, or for any other purpose.

In any event, having withdrawn claims 11-20 from consideration, the Examiner rejected claim 1 under 35 U.S.C. 102(e) as anticipated by Mimata et al. U.S. Patent 6,505,397 B1 (Mimata), and claims 3, 4, 5, and 10 under 35 U.S.C. 103(a) as being unpatentable over Mimata. However, for unknown reasons, perhaps through inattention, claims 2 and 6-9 were not explicitly rejected, though they were referred to in the discussion of the anticipation rejection.

Applicants responded in a communication dated March 25, 2005 by rewriting claim 1 as new claim 21, in part to further emphasize that detachment of the die from the film is *initiated* by pushing up on the corners. This was distinguished from Mimata, in which detachment of the die was initiated by pushing up at the center.

Also, an additional claim 22 was presented. This was directed to an optional center pin, which was specified as not contacting the film before the corner pins.

In a final Office Action dated May 31, 2005, the Examiner withdrew the rejections based on Mimata, and instead, rejected independent claim 21, and dependent claims 2 and 6-9 under 35 U.S.C. 102(b) as being anticipated by European Published Patent Application EP 0 431 637 A1 (Nishiguchi), and under 35 U.S.C. 102(e) as being anticipated by Kurosawa et al. U.S. Patent 6,201,306 B1 (Kurosawa). He further rejected claims 3-5 and 10 under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi or alternatively, over Kurosawa. Nishiguchi was newly cited in this Office Action. Kurosawa had been cited, but not applied, in the December 28, 2004 Office Action.²

Also, in this Office Action, claim 22, was objected to as being dependent on a rejected base claim, but was indicated to be allowable if rewritten in independent form to incorporate the limitations of the base and intervening claims.

2. Kurosawa was originally brought to the Examiner's attention in an IDS filed with the application. It is not apparent why Kurosawa became pertinent enough to apply as a consequence of the amendments of March 25, 2005, but not before.

After an interview with the Examiner, on July 29, 2005, an amendment was filed pursuant to 37 C.F.R. § 1.116, and the Examiner responded with an Advisory Action dated August 12, 2005. Here, he repeated the grounds for the final rejection, but characterized claim 22 as withdrawn, along with non-elected claims 10-20.³ This appeal followed on August 30, 2005.⁴

VI. ISSUE TO BE DECIDED IN THIS APPEAL:

Whether the Examiner was correct in finally rejecting claims 2-10 and 21, and in particular, in rejecting independent claim 21, and dependent claims 2 and 6-9 under 35 U.S.C. 102(b) as being anticipated by Nishiguchi or Kurosawa, and further, in rejecting claims 3-5 and 10 under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi or Kurosawa.

VII. GROUPING OF CLAIMS:

For purposes of this appeal, claims 21 and 8 stand or fall together, and claims 6 and 7 stand or fall together, with respect to the rejection under 35 U.S.C. 102(b) as anticipated by Nishiguchi. Claims 21 and 6-8 stand or fall together with respect to the rejection under 35 U.S.C. 102(b) as anticipated by Kurosawa. The other rejected claims involve respective separate issues.

VIII. ARGUMENT:

A. Introduction

This appeal involves no subtle or complex issues of law, but only attentive and proper reading of two references, and straightforward application of what is disclosed in these references to the claims on appeal. As will be demonstrated, there is no reasonable interpretation of Nishiguchi or Kurosawa from which it may be said that base claim 21, and dependent claims 2 and 6-9 are

3. See footnote 1 above.

4. Responsive to the Advisory Action, on August 30, 2005, a Supplemental Amendment was filed together with the Notice of Appeal proposing to cancel claims 10-20, and to correct a proofreading error in claim 21. The amendment was entered for purposes of appeal.

anticipated by either of these references. And while this alone is a sufficient reason to reverse the final rejection, it will also be demonstrated that claims 3-5 and 10 are not obvious over Nishiguchi.

B. The Prior Art

Both references relate to separation of semiconductor chips from an adhesive film carrier, but in neither case is separation initiated by pins located at the corners of the chip.

Nishiguchi

This reference concerns separation of semiconductor chips from an adhesive carrier tape by irradiating the tape prior to separation in order to weaken the adhesive bond. The invention is said to be especially useful for chips which include a back metal portion. As described in the reference, this is conventionally done by exposing the entire tape to radiation, but this conventional practice is unsatisfactory where not all of the chips are to be removed from the tape at one time since the chips remaining on the tape are no longer firmly bonded.⁵

In Nishiguchi's first embodiment, as illustrated in Figures 1-4, the tape 4 under a chip 5 which is to be removed is irradiated within the margins of the chip to initiate separation by weakening the adhesive bond only in the irradiated area. The tape is then pushed up by a set of pins 6a to 6d, as shown in Fig. 1B. These lift the chip toward a vacuum collet 7 which exerts a sufficient force on the chip to overcome the weakened adhesive bond, whereby the chip separated from the tape. Thus, separation is initiated, not by physical contact between the pins and the tape, but by the photochemical process resulting from irradiation.

Moreover, as shown in Fig. 3 and described at page 3, lines 55-59, the irradiation is confined within the margin of the chip by at least 0.1 mm. to prevent irradiation of the tape under adjacent chips. Thus, the adhesive bond is weakened, not above the pins, but everywhere else. In other words, detachment of the chip from the film is not initiated at the corners of the chip.

A second embodiment of the invention is described in connection with Figures 5 through 8. Here, the adhesive is weakened in only one corner of each chip. As shown in Fig. 5, this is done by means of light source 8 and a mask 9 which confines the irradiating light to the desired area.

Again, push-up pins 6a through 6d are employed to lift the tape and chip, but as described at page 5, lines 17-32, and as shown in Figure 6, push-up pins 6a through 6c are located close to the

5. See Nishiguchi, page 2, lines 10-29.

corners of the chip, while pin 6d is displaced from the corner of the chip by at least 5% of the length of a diagonal line on the lower surface of the chip. Then, as explained at page 5, line 43-46, because pin 6d is displaced from the irradiated corner, separation of the chip from the tape starts only at that corner, while the other three pins support the chip on the tape. Again, however, the separation is initiated by radiation, and not the physical contact of the pins on the tape at the four corners of the tape. In any event, there is contact at only three corners.

Variations of the second embodiment are shown in Figures 8B and 8C. Again, the irradiated areas are shown cross-hatched, and it is the irradiation which initiates the separation. However, there is no drawing or description of the location of pins or description of the separation mechanism.⁶

Finally, in the embodiment of Fig. 9, pin 6a, which is the pin diagonally opposite the irradiated corner, is located further below the tape than the other three pins, and in Fig. 10, the pin under the irradiated corner is further below the tape. In both instances, the separation is initiated by irradiation, and in any event, not by contact at the four corners.

Kurosawa

This reference is concerned with two problems, namely retention of adhesive on the chip after separation from the tape, and puncturing of the tape during the push up process, causing portions of the tape to remain on the chip.⁷ Kurosawa addresses this problem by employing pins with enlarged heads as illustrated in Figs. 8 and 9, instead of conventional smaller heads as illustrated in Figs. 4 and 5.

Actually, the purported prior art problems are addressed at length in this reference, and the Examiner appears to be relying on Fig. 3C, which is one of a sequence (i.e., Figs. 3A-3D) showing conventional practice.⁸

6. On page 6, at least 50-54, it is stated that “the irradiated area includes a portion to which at least one of the corner portions of the semiconductor chip is adhered and fixed,” and since Figs. 8B and 8C represent variations of the second embodiment, it is respectfully submitted that a person skilled in the art would understand the pins are spaced as in Fig. 6.

7. See, for example, col. 2, lines 48-59.

8. See Final Office Action mailed May 31, 2005, page 5. Although the Examiner also refers to Figs. 1-31, which he says “teaches the claimed invention”, he offers no explanation of this, and does not address the significance of any part of this reference except Fig. 3C.

In any case, Kurosawa does not disclose, teach or suggest initiation of separation of a chip from the tape by use of pushup pins located substantially under the corners of the chip, either in its discussion of the prior art or the invention itself. For one thing, the word “corner” (or “corners”) is never mentioned, nor is there any synonymous term. Further, regarding the illustration of conventional practice in Fig. 3C, pins 17 are certainly not shown to be substantially under the corners of die 13.

Pins 27 are also not shown as being substantially under the corners of chip 13 in Kurosawa’s actual invention, as illustrated in Figs. 7A-7D, and there is no disclosure, teaching or suggestion in this reference that the ejector pins engage the tape under the corners of the chip to initiate delamination. In fact, the enlarged heads of the pins, by their very size and shape can not just contact the tape substantially under the corners of the die, to initiate separation, or for any other purpose.⁹

C. The Final Rejection

The Examiner has asserted that each of the features of independent claim 21 and dependent claims 2 and 6-9 are shown in Nishiguchi, and refers to Figs. 1-10, where the claimed invention is purportedly taught.¹⁰ He similarly asserts that these claims are anticipated by Kurosawa, and refers to Figs. 1-31, which again purportedly “teaches the claimed invention”.¹¹

Further, the Examiner asserts that claims 3-5 and 10 are obvious over Nishiguchi¹² or over Kurosawa.¹³ As demonstrated below, none of these rejections is valid.

9. This fact was mentioned by the Examiner during the interview on his own initiative.

10. See Final Office Action mailed May 31, 2005, pages 2-4. A copy of Fig. 9B has been inserted in the text in connection with this rejection.

11. See Final Office Action mailed May 31, 2005, pages 5-7. A copy of Fig. 3C has been inserted in the text in connection with this rejection

12. See Final Office Action mailed May 31, 2005, pages 4-5.

13. See Final Office Action mailed May 31, 2005, pages 7-8.

D. Analysis of the Final Rejection

Claim 21 and 6-8

The Examiner asserts that pins 6a-6d of Nishiguchi and pins 17 of Kurosawa are “operative to initiate detachment of a die from the film by contacting the film . . . substantially at *the corners* of the die . . .”, as recited in claim 21. As explained in Section VIII B above, separation in Nishiguchi is initiated not by physical contact, but by irradiation, and in any case, at least one of pins 6a-6d is spaced away from its respective corner by a distance which is at least 5% of the diagonal length of the underside of the chip. Thus, in Nishiguchi, there are no pins at “the corners”, i.e. at all four corners, as required by the claim.

Likewise, in Kurosawa, there is no disclosure, teaching or suggestion that the prior art pins 17 or the patented pins 27 contact the film substantially under the corners of the chip. In fact, Figs. 3A-3C, 6, and 7A-7D clearly show that opening 18, and consequently, pins 17 and 27 which pass through these openings are not substantially at the corners of the die.

Moreover, as the Examiner himself observed during the interview, given the size and configuration of pins 27 preclude them from doing so as well.

In short, neither reference discloses, teaches or suggests:

ejector pins . . . operative to initiate detachment of a die from the film
by contacting the film . . . substantially at the corners of the die . . .

as required by claim 21, and this claim is accordingly not anticipated by either Nishiguchi or Kurosawa.

Claims 6-8 are dependent on claim 21, and are therefore not anticipated by Nishiguchi or Kurosawa for the reasons stated above. Further with respect to claims 6 and 7, Nishiguchi does not disclose, teach or suggest:

a vacuum ejector platform for supporting a portion of the film on
which the die to be detached is mounted while the film is contacted by
the ejector device.

Element 12 is simply referred to as a “pushup stage”. The only reference to vacuum is in connection with collet 7. Claims 6 and 7 are accordingly not anticipated by Nishiguchi for this reason as well.

Claim 2

Claim 2 is dependent on claim 21, and is therefore not anticipated by Nishiguchi or Kurosawa for the reasons stated above. Moreover, neither reference discloses, teaches, or suggests determining the spacing of the pins from the corners of the dies:

... by considering one or more factors in the group consisting of the thickness, size and elastic modulus of the die, the thickness and elastic modulus of the film, the interfacial adhesive strength between the die and the elastic surface of the film and the shape and size of the ejector pin.

To support the rejections of claim 2, the Examiner says, with respect to both Nishiguchi and Kurosawa, that he:

... takes the position that since not all dice are the same size and the pins 14 are aligned along the perimeter these factors claimed are considered.

Aside from the fact that there are no pins 14 in either reference, where in the world does the Examiner find even a mention of the factors recited in claim 2 as quoted above in either reference? And isn't it the most rank speculation for him to say that the "factors claimed are considered" when they aren't even mentioned? In short, the rejection of claim 2 is utterly baseless.

Claim 9

Like claim 2, claim 9 is dependent on claim 21, and is therefore not anticipated by Nishiguchi or Kurosawa for the reasons stated above. Moreover, neither reference discloses, teaches, or suggests an apparatus including:

one or more ejector pins corresponding to a position substantially at a center portion of the die.

With respect to this, the Examiner states that the claimed feature is taught in both Nishiguchi and Kurosawa. Regrettably, however, he doesn't say where this feature is found in the references. The fact is, there is no such thing in either reference. Again, like the rejection of claim 2, the rejection of claim 9 is utterly baseless.

Claims 3-5 and 10

These claims are each dependent on claim 21, and are not obvious over either Nishiguchi or Kurosawa for the reasons stated above. Apart from that, however, the Examiner has lumped all these claims together, and uses identical language in rejecting these claims as obvious over both references.

The Examiner has missed the boat entirely here. Indeed, there isn't anything about this rejection which is correct. To begin with, what "teaching of the references" is the Examiner thinking about in the first line of Section 23 of the Final Office Action? And how do these teachings make anything obvious?

Moreover, these claims are not directed to specification of "optimum thickness, temperature [or] condition of delivery" of anything, as stated by the Examiner in the Final Office Action.¹⁴ Rather claims 3-5 recite a maximum spacing of the point of contact of the pushup pins from the edge of the dice, and claim 10 recites a minimum support area for the ejector pins.

What is perhaps most egregious, is that the Examiner appears to have pulled citations of cases out of the M.P.E.P.¹⁵ without giving any thought to their relevance. For example, claims 3-5 and 10 do not merely recite optimum or workable ranges "discovered by routine experimentation" of parameters or general conditions already disclosed in the prior art as relevant. Instead, they recite parameters (i.e., spacing of the ejector pins from the edges of the die in the case of claims 3-5 and pin area in the case of claim 10) which are not disclosed, taught, or suggested in the prior art as having any relevance to the problem of die breakage. Further, in the case of claims 3-5, they specify how the claimed parameter is related to certain physical properties of the dice. *In re Aller, Lacey and Hall*, which the Examiner did not even cite accurately¹⁶ is totally irrelevant.

In re Woodruff, 919 F.2d 1575, 16 USPQ 2d 1934 (Fed. Cir. 1990), also cited by the Examiner, is equally irrelevant. Applicants have no duty to show that a claimed value of a parameter is critical without some teaching or suggestion in the prior art (e.g., a close value or range for the same parameter) from which obviousness might be inferred. The burden is never on an applicant to "prove" anything in the absence of a *prima facie* showing of obviousness. There is no such showing here.¹⁷

14. See Section 12, lines 1 and 2; Section 23, lines 1 and 2.

15. See, for example, Section 2144.05.

16. The correct citation is 220 F.2d 454, 105 USPQ 233 (CCPA 1955).

17. M.P.E.P. §2142, *et seq.* discusses how a *prima facie* showing of obviousness is to be made.

Finally, the cases cited on page 8 of the Final Office Action are equally irrelevant. There is no issue here concerning difference in claimed properties or the content of a declaration under 37 C.F.R. § 1.132.

In short, no basis for rejecting claims 3-5 and 10 has been presented by the Examiner.

IX. CONCLUSION:

Regretfully, it is believed that the Examiner has failed to give attentive and thoughtful consideration to the issues of patentability in connection with this application, and it is respectfully submitted that no credible basis exists on this record for rejection of any of the claims. The final rejection should accordingly be reversed.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Mail Stop Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on June 1, 2006:

Lawrence A Hoffman
Name of applicant, assignee or
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APPENDIX A
CLAIMS ON APPEAL

2. An apparatus as claimed in claim 21, wherein the predetermined distance is determined by considering one or more factors in the group consisting of the thickness, size and elastic modulus of the die, the thickness and elastic modulus of the film, the interfacial adhesive strength between the die and the elastic surface of the film and the shape and size of the ejector pin.

3. An apparatus as claimed in claim 21, wherein the predetermined distance is less than 1.2 mm from the edges of the die where the die is a silicon die of between 3 mm to 8 mm in width and less than 0.15 mm thickness, the film has a thickness of approximately 0.1 mm and an interfacial adhesive strength between the die and the adhesive surface is less than 15 Joules per meter square.

4. An apparatus as claimed in claim 21, wherein the predetermined distance is less than 1.6 mm from the edges of the die where the die is a silicon die of greater than 8 mm in width and less than 0.15 mm thickness, the film has a thickness of approximately 0.1 mm and an interfacial adhesive strength between the die and the adhesive surface is less than 15 Joules per meter square.

5. An apparatus as claimed in claim 21, wherein the predetermined distance is less than 0.5 mm from the edges of the die where the die is a gallium arsenide die of between 3 mm to 8 mm in width and less than 0.15 mm thickness, the film has a thickness of approximately 0.1 mm and an interfacial adhesive strength between the die and the adhesive surface is less than 15 Joules per meter square.

6. An apparatus as claimed in claim 21, including a vacuum ejector platform for supporting a portion of the film on which the die to be detached is mounted while the film is contacted by the ejector device.

7. An apparatus as claimed in claim 6, including apertures corresponding substantially to positions of each corner of the die to be detached, wherein the ejector pins are houseable within the vacuum ejector platform and projectable through said apertures for contacting the die.

8. An apparatus as claimed in claim 21, wherein the ejector device comprises at least four ejector pins, each ejector pin corresponding to a position substantially at a corner of the die.

9. An apparatus as claimed in claim 8, including one or more ejector pins corresponding to a position substantially at a center portion of the die.

10. An apparatus as claimed in claim 21, wherein each ejector pin has an effective support area of at least $1 \times 10^{-4} \text{ mm}^2$.

21. An apparatus for detachment of a thin die from a film, the film having a adhesive surface on which a plurality of dice are mounted, the apparatus comprising:
an ejector device comprising a plurality of ejector pins,
the ejector pins being operative to initiate detachment of a die from the film by contacting the film under the die on a second surface of the film opposite the adhesive surface substantially at the corners of the die within a predetermined distance from the edges of said die and by raising the film under the corners of the die; and
a collet operative to detach the die from the film after detachment has been initiated by the ejector device, and to hold the die after detachment from the film.

APPENDIX B
EVIDENCE

None.

APPENDIX C
RELATED PROCEEDINGS

None.